sive through the failure of the unpaired gene in the heterozygotes to produce a visible effect.

A number of excellent text figures and six plates, five of them colored, add greatly to the attractiveness of the book, and the press work leaves nothing to be desired.

This little manual is worthy of an even larger measure of the appreciation which has been given to its two preceding editions by those engaged in other scientific fields, and by general readers who are not themselves engaged in science, but who like to keep themselves informed on the advances that are being made in science.—GEO. H. SHULL.

MINOR NOTICES

Alpine plant life.—In an attractive volume intended for the general reader, ARBER[4] has described the plant life of the higher altitudes of the Swiss Alps. The plants are treated in ecological groups, and an evident effort has been made, not unsuccessfully, to maintain the ecological point of view throughout. It might be questioned if most modern ecologists would find as many beautiful adaptations as are evident to the author, who declares that not only the color of the flowers, but the density of their pigment "may be primarily due to a specialization in favor of a particular class of insect visitor." Other adaptations of alpine plants receive considerable attention, and the probable origin of the alpine flora is briefly discussed.

The text is pleasing in style, the descriptions are accurate and profusely illustrated by more than 75 excellent plates and figures. A glossary of botanical terms and a chapter on the structure of the flower should make all the descriptions intelligible even to the reader who is entirely without scientific training.—GEO. D. FULLER.

NOTES FOR STUDENTS

Cecidology.—The anatomy and histology of insect galls continues to be an interesting and profitable field not only for the entomologist, but also for the plant pathologist and the experimental biologist. WEIDEL[5] gives us a valuable study of the life history of the gall of *Neuroterus vesicator* Schlecht. He first calls attention to the failure thus far to explain experimentally the reason for gall formation, and the necessity of comparing the structure of the gall with the normal structure of the plant. After briefly reviewing the history of the study of the gall structures, especially the studies of BEYERICK, who attributed the gall characters which are recognized by the zoologist to a "growth enzyme," he discusses his methods. These methods are well worthy

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[4] ARBER, E. A. NEWELL, Plant life in alpine Switzerland. 8vo. pp. xxiv+355. *pls. 47. figs. 30.* London: John Murray. 1910. $1.50.

[5] WEIDEL, F., Beiträge zur Entwicklungsgeschichte und vergleichenden Anatomie der Cynipidengallen der Eiche. Flora **102**:279–334. *pl. 15. figs. 49.* 1911.

of notice by our American workers. The mature galls were taken into the laboratory and the insects hatched. These insects were then imprisoned in glass cylinders with leaves and buds of the oak, and the oviposition observed. The material was then fixed in Flemming's fixer at various intervals following oviposition, and sectioned. He confirms the observations of BEYERICK on the ovipositions, and states that in this species the female does not puncture the plant tissue. The "growth enzyme" is from the larva, and the gall formation begins with the hatching of the larva, which becomes inclosed by a cell growth within about 24 hours. In the second part of this paper the author makes a comparative study of the sclerenchyma cells of a number of galls. He also states that the character depends somewhat upon the part of the host plant on which the gall is formed.

KÜSTER[6] gives a brief discussion and criticism of one of TROTTER'S[7] recent papers, in which he compares the protoplasmic and histological characters of certain galls with the primary axis of the dicotyledonous plants. He agrees in part, and cites the great similarity between galls and fruits as evidence. He calls attention to the necessity of comparative study of the structure of gall with the normal structure of the plant. The galls and dicot stems both have the radial arrangement of parts, with parenchyma tissue in the center, but the fibrovascular bundles of the galls are not so well developed as in the stems. KÜSTER sees enough differences in structural characters to prevent agreement with TROTTER, but does not go into an extended discussion of these differences.

GREVILLIUS[8] gives a very interesting discussion of certain pseudo-galls or Thysanopterocecidia. The first of these was briefly described by RUBSAAMEN in 1901. The author agrees with RUBSAAMEN, but gives a more detailed discussion. The insect attacks the upper surface of the leaf, causing the tips to curl. The upper epidermis is seriously injured and the mesophyll somewhat distorted, but the palisade cells only slightly changed. The mesophyll is poorer in chlorophyll than in the normal leaves. When the buds are attacked they fail to develop. A similar gall not previously described occurs on *S. graminea*. A Thysanopterocecidia on the *Polygonum Convolvulus* is also described, but in this the insect attacks the under surface of the leaves. The structural characters are practically the same as the preceeding.

The LEEUWEN-REIJNVAANS[9] give a fourth paper on the cecidia of Java,

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[6] KÜSTER, ERNEST, Ueber die Sprossähnlichkeit der protoplasmatischen Gallen. Marcellia **9**:159, 160. 1911.

[7] TROTTER, A., Sulla possibilita di una omolgia caulinare nelle galle prosplastiche. Marcellia **9**:109. 1911.

[8] GREVILLIUS, DR. A. Y. VON, Notizen ueber Thysonopterocecidien auf *Stellaria media* Cyr., *S. graminea* L., und *Polygonum Convolvulus* L. Marcellia **9**:161–167. 1910.

[9] LEEUWEN-REIJNVAAN, J. und W. DOCTORS, Einige Gallen aus Java. Vierter Beitrag. Marcellia **9**:168–193. 1911.

in which they describe 50 specimens, most of which are caused by insects of the genus *Cecidomyia*. This material was collected in the Oengaran mountains at an elevation of 700 to 1000 meters. Large, soft galls with water parenchyma were especially abundant.

TROTTER[10] gives brief descriptions of 24 species of galls collected by Dr. FORTI in Asia Minor, and occurring on *Quercus aegilops* L. (*Q. vallonea Kosch.*), *Q. lusitanica* Lan., and *Rosa* sp. Most of these species had already been described.

KIEFFER (Bitsch) and HERBST (Valparaiso)[11] describe seven new species of cecidia and insects producing them, from Chile, and give brief descriptions of those species not previously described.

Among the papers on American cecidology we note FELT'S[12] key, parts of which will be serviceable to the botanist as well as to the entomologist, but there are not enough characters of the galls given to enable exact determinations.

EDITH M. PATCH[13] gives a most excellent piece of work on the aphis galls of the elms. Although, with the exception of brief descriptions of the galls, the major part of the work is devoted to the biology and life history of the insects, the work is of great value to the botanist. Several species which have previously been very much confused are separated in a manner which makes them easily distinguishable. The value of the work is increased by the illustrations and bibliographies.

SMITH'S[14] bulletin comes to us as a valuable contribution on bacteriocecidia. The historical discussion and the long series of experiments are interesting and valuable. It is very doubtful if any cecidia have a wider range of host plants than has been proven for this one. The fact that the galls are produced most readily in soft, rapidly growing tissues, is in harmony with results already obtained by the study of insect cecidia, and further studies will doubtless bring out other similarities. The very limited discussion given to the stimulus and to the character of the cecidia leads us to hope for another bulletin in which these phases of the subject will receive more attention.

NORTON[15] records a very interesting crown swelling of the peach due to

[10] TROTTER, A., Pugillo di Galle Roccolte dal Dr. A. FORTI in Asia Minor. Marcellia **9**:193–197. 1911.

[11] KIEFFER, VON, und HERBST, P., Ueber Gallen und Gallenthiere aus Chile. Cent. f. Bakt. Paras. u. Infek. **29**:696–704. 1911.

[12] FELT, E. P., Gall midges of *Aster*, *Carya*, *Quercus*, and *Salix*. Jour. Econom. Ent. **3**:347–356. 1911.

[13] PATCH, EDITH M., Gall aphids of the elm. Bull. No. 181, Maine Agric. Experiment Station. 1911.

[14] SMITH, E. F., BROWN, N. A., and TOWNSEND, C. O., Crown gall of plants; its cause and remedy. Bur. Plant Industry, Bulletin 213. 1911.

[15] NORTON, J. B. S., Crown swelling disease of peach. Phytopathology **1**:53, 54. 1911.

unknown causes. The structure of the swelling is characterized by spongy masses of parenchyma filled with starch and interspersed with woody layers.

An interesting myco-cecidia of the orange is described by FLORENCE HEDGES.[16] This cecidia is attributed to *Sphaeropsis tumefaciens*, nov. sp., which is described. The external characters of the gall are given, but the development and histology are omitted.—MEL T. COOK.

Phycomycetes.—PETERSEN gives an abbreviated English translation of his paper on the aquatic Phycomycetes of Denmark, which was originally published in Danish. The paper[17] is divided into three parts, the first dealing with the phylogeny and relationships of the Phycomycetes, the second with their occurrence and distribution, and the third with descriptive taxonomy.

As to their phylogeny, the author adheres to the view that the aquatic Phycomycetes and their near relatives constitute a phylogenetic series. If they were derived from the algae at various levels, they would hardly show the homogeneity which runs through the aquatic forms. As to the direction of their evolution, he holds that the lower Phycomycetes have been derived from the higher forms through reduction of the plant body. This view, which necessitates the assumption that motile zoospores and cilia were acquired by the degenerating forms, meets with difficulty when the non-aquatic Peronosporales are considered. The author regards the Pythiaceae, on account of their probable relationship with *Lagenidium*, as the ancestors of Lagenidiaceae. The Peronosporales, to which the Pythiaceae belong, would therefore form a part of the reduction chain, and it would be necessary to assume that zoospores adapted to aquatic conditions have arisen among the aerial Peronosporaceae from conidia eminently suited for aerial distribution. The alternate hypothesis that the Peronosporaceae are losing their aquatic characters in a dry habitat, instead of acquiring them, seems more reasonable. The chief argument of the author is directed against the view of FISCHER that the Phycomycetes are derived from the Monadineae. Here he rightly points out, among other differences, that the germinating zoospore of the Phycomycetes leaves the spore membrane behind, while in the endophytic Monadineae the zoospore makes its way in its entirety into the host cell. The author rightly regards the Synchytriaceae as a distinct group, which represents a line of development different from the rest of the Chytridiales. The idea is not fully carried out, however, in his synopsis of the families given later.

In the second part of the paper are given many interesting observations on the biology and distribution of the aquatic Phycomycetes in Denmark. The Saprolegniales occur frequently on fish and frog spawn, but they do not

[16] HEDGES, FLORENCE, *Sphaeropsis tumefaciens*, nov. sp., the cause of the lime and orange knot. Phytopathology **1**:63–65. 1911.

[17] PETERSEN, H. E., An account of Danish freshwater Phycomycetes, with biological and systematical remarks. Ann. Myc. **8**:494–560. *figs. 27.* 1910.

———, Studier over Ferskvands-Phycomyceten. Botanisk Tidsskrift **29**: 345–429. *figs. 27.* 1909 (with English abstract).